X-6315

SUPPLEMENT

to

COACH MAINTENANCE MANUAL X-6215

AND

MODEL VH HYDRAULIC DRIVE MANUAL X-5817

GM
GENERAL MOTORS CORPORATION
COACHES

COACH MODELS

TDH AND TDM

4518, 4519, 5303, 5304

SDH AND SDM

4502, 5302

GMC TRUCK & COACH DIVISION
GENERAL MOTORS CORPORATION
Pontiac, Michigan

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INTRODUCTION

Information in this supplement, when used in conjunction with Coach Maintenance Manual X-6215 and Model VH Hydraulic Drive Manual X-5817, provides coverage for Coach Models shown on the title page.

The supplementary information herein is divided into two major groups: that which pertains to X-6215 and that which pertains to X-5817. Illustrations within each major group are numbered consecutively. Information is arranged in the same sequence and under same section headings as in manuals X-6215 and X-5817.

IMPORTANT: Refer to the applicable section in this supplement (see index below) to determine whether there is supplementary information before servicing any unit or system on models shown on title page.

SECTION INDEX

GENERAL BODY MAINTENANCE

SIDE WINDOWS

The long side windows on these coaches incorporate a sliding sash lock in the front section which can be used to retain the window locked closed or in one of three open positions. See figure 1. If desired, the window can be locked closed, thus preventing passengers from opening windows and interfering with the air conditioning system. A small set screw at forward end of lock can be turned in (clockwise) with release button not held in until screw bottoms against the lock pawl. This will block the travel of the lock plunger thereby preventing the unlatching of lock.

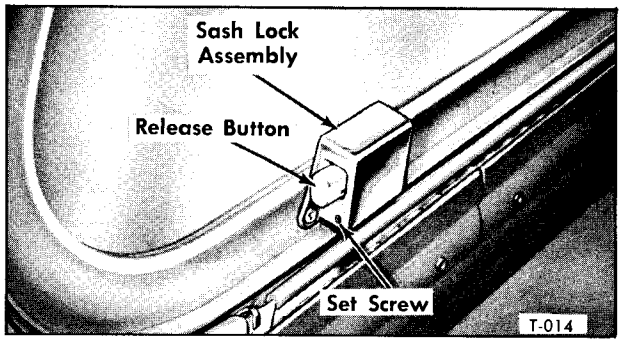


Figure 1—Side Window Sash Lock

WINDSHIELD WIPERS

The windshield wiper arms on coaches covered by this publication are of single-type not requiring a pantograph arm as used on previous model coaches.

In addition to the arm position-to-motor shaft being adjustable, the blade-to-arm position is also adjustable. Refer to figure 2.

To adjust blade position, loosen blade attaching nut, then while arm is in parked position (arms outward) locate blade vertically to obtain a 20 degree angle between lower portion of blade and the arm as shown.

After making adjustment, tighten blade attaching nut firmly.

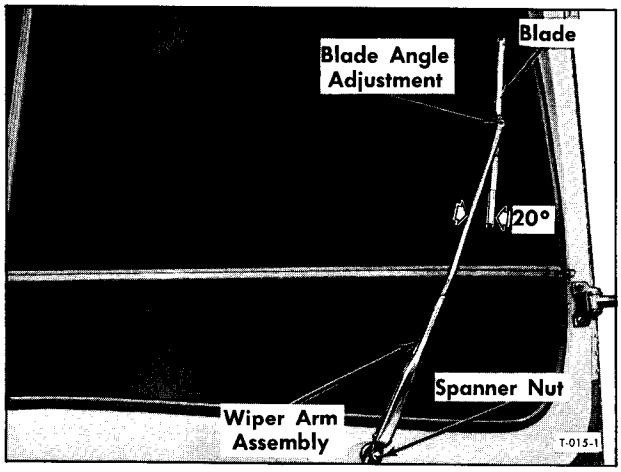


Figure 2—Wiper Arm and Blade Installed

DOORS AND CONTROLS

PUSH-TYPE REAR DOOR LINKAGE ADJUSTMENT (TRANSIT COACHES)

The following revised adjustment procedure, if performed as directed, will assure safe and proper operation of the rear door operating mechanism.

NOTE: Key numbers in following text refer to figure 3.

1. Carefully disengage door return spring (8), then disconnect the check cylinder rod eye (6) from cylinder lever (7).

2. Loosen wedge bolts which clamp door front and rear levers (21 and 12) to door shafts.

3. Prop or clamp door panels in fully closed position.

4. Check and if necessary adjust connecting rods (14 and 19) to measure 13-15/16-inch center-to-center of pin holes. To adjust, loosen lock nuts (13), then turn rod turnbuckle (29).

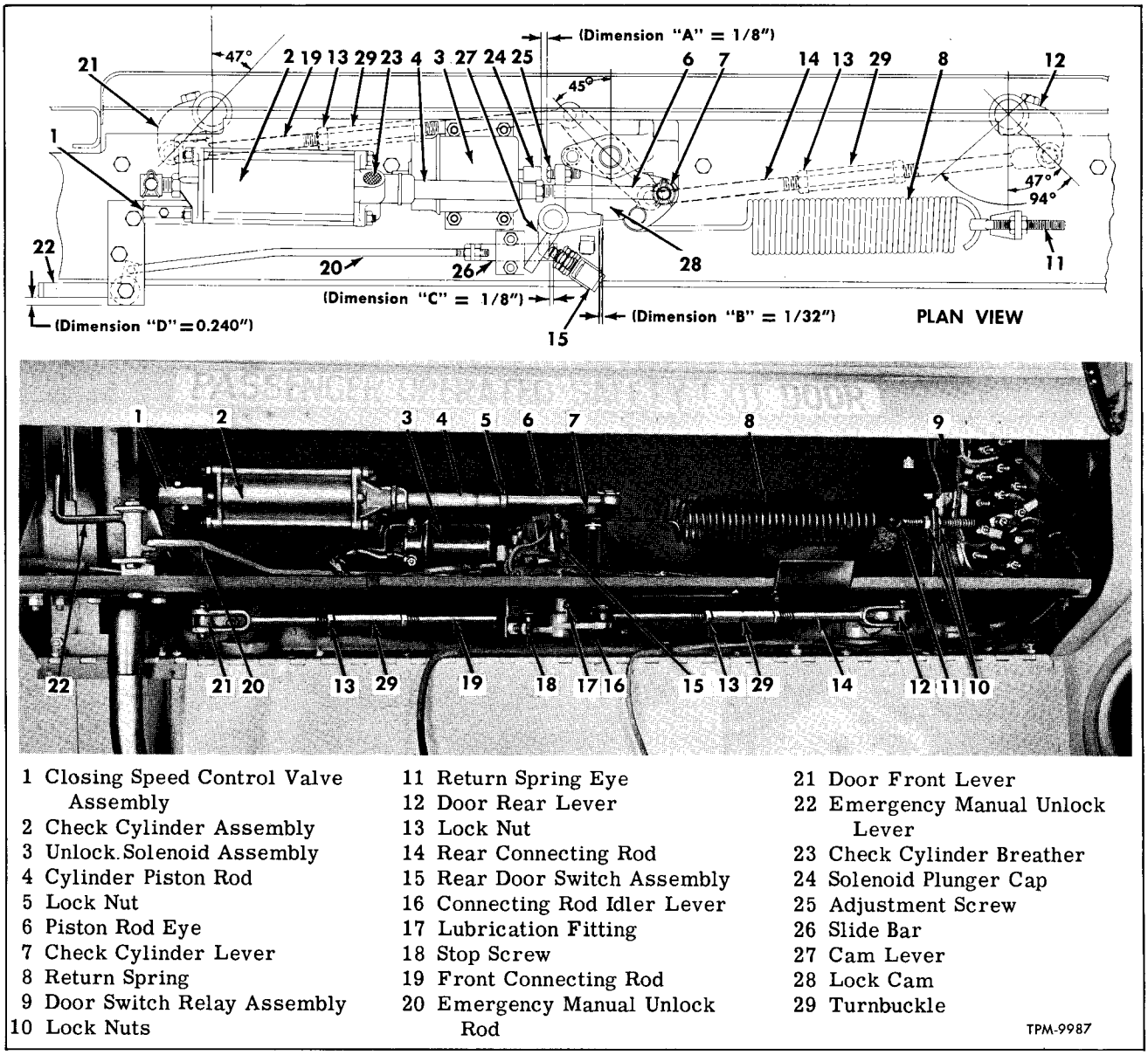
5. With lock cam lever (27) engaged fully in lock cam (28), tighten door shaft lever clamp bolts to 50 foot-pounds torque.

6. Remove prop or clamp from door panels.

7. Carefully hook up the door return spring (8).

8. Check and if necessary, adjust the tension of door return spring (8). Adjustment is obtained by repositioning two eye bolt nuts (10) at spring anchor bracket. Proper spring tension exists when a push-type spring scale applied at the inside front face of the door panel indicates no more than 10 pounds to start doors moving away from completely closed position.

9. With doors closed and locked, there must be a clearance of 1/32-inch "B" between the forward edge of lock cam lever (27) and lock cam (28). A fine adjustment to secure this dimension is made by slight adjustment of connecting rods (14 and 19).



1 Closing Speed Control Valve Assembly
2 Check Cylinder Assembly
3 Unlock Solenoid Assembly
4 Cylinder Piston Rod
5 Lock Nut
6 Piston Rod Eye
7 Check Cylinder Lever
8 Return Spring
9 Door Switch Relay Assembly
10 Lock Nuts
11 Return Spring Eye
12 Door Rear Lever
13 Lock Nut
14 Rear Connecting Rod
15 Rear Door Switch Assembly
16 Connecting Rod Idler Lever
17 Lubrication Fitting
18 Stop Screw
19 Front Connecting Rod
20 Emergency Manual Unlock Rod
21 Door Front Lever
22 Emergency Manual Unlock Lever
23 Check Cylinder Breather
24 Solenoid Plunger Cap
25 Adjustment Screw
26 Slide Bar
27 Cam Lever
28 Lock Cam
29 Turnbuckle

TPM-9987

Figure 3—Standard Rear Door Check Cylinder and Linkage

10. Adjust solenoid striker adjusting bolt (25) on cam lever to provide a minimum space of 1/8-inch "A" between head of bolt and solenoid plunger when the solenoid is de-energized.

11. Adjust door opening stop screw (18) to contact idler lever (16) when doors, in full-open position, are at a 90 degree angle to front edge of step.

NOTE

If additional door opening clearance is desired, stop screw may be adjusted with doors set at a 95 degree angle to front edge of step.

12. Before installing door check cylinder piston rod to lever (7), force the piston rod to bottom in check cylinder. With doors in full-open position, adjust length of cylinder piston rod until rod eye will drop freely on pin of cam lever (7).

IMPORTANT

Do not move cylinder piston out during this procedure.

13. Adjust the door closing speed as directed under "Rear Door Closing Speed Control Valve" on page 48 in Maintenance Manual X-6215.

14. Check door opening and locking action, make final adjustments if necessary, then tighten all adjustment lock nuts, and install linkage retainers and cotter pins.

15. Adjust rear door (micro) switch (15) to break light and interlock circuits when lock cam lever (27) has moved approximately 1/16-inch into the step of lock cam (28) as shown in figure 4. By means of switch mounting nuts, switch can be located fore and aft in mounting bracket as necessary. Secure switch position by tightening lock nuts against mounting nuts.

IMPORTANT

Proper switch adjustment is necessary as the interlock system as well as door signal lights will be affected.

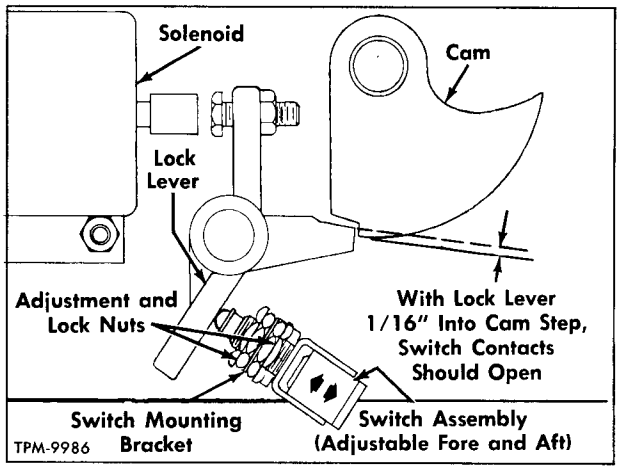


Figure 4—Rear Door Switch Adjustment Points

HEATING AND VENTILATION

ACCESS TO HEATING AND VENTILATION BLOWER COMPARTMENT

Access to the underfloor blower compartment on coaches covered by this supplement has been revised. Four rotary-type latch fasteners retain hinged compartment access door closed as shown in figure 5.

On previous model coaches, access was gained after removing many bolts and washers which attached the access panel to compartment, then moving the panel to one side.

With access door open on these coaches, the blower wheels can be serviced.

ACCESS TO HEATING SYSTEM WATER PUMP AND MODULATION VALVE (TRANSIT MODELS)

On previous model coaches it has been somewhat difficult to replace the heating system water pump or the modulation valve as access to unit attaching bolts was restricted by limited opening in longitudinal duct.

On these model coaches, access to unit attaching bolts can be readily gained after removing the screw-retained access cover from longitudinal duct located directly over the unit attaching bolts.

Before removing this cover the main cover over units must be removed.

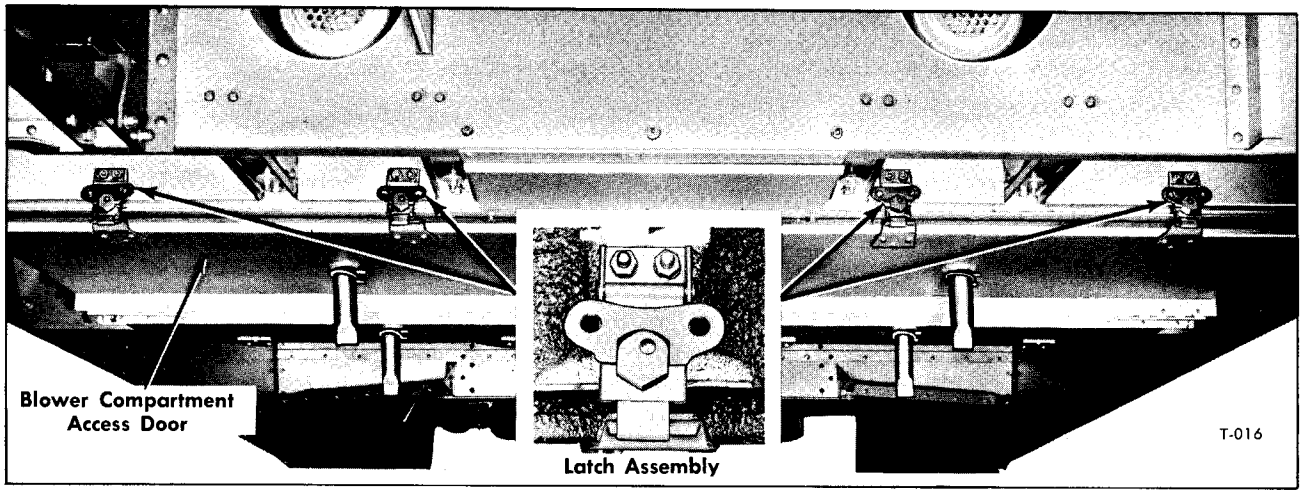


Figure 5—Access Door to Underfloor Blower Compartment

BRAKES

AIR COMPRESSOR DISCHARGE MUFFLER

The air compressor discharge muffler mounted in engine compartment on bulkhead above transmission on previous coaches is no longer used on coaches covered by this supplement. Figures 1 and 2 on page 85 in Maintenance Manual X-6215 show location of muffler used previously.

On these coaches, the air compressor flexible discharge line connects directly to the air line check valve which is bracket-mounted to bulkhead.

ELECTRICAL SYSTEM

STARTER CONTROL AND GENERATOR RELAY (1115822)

Starter control and generator relay (1115822) is used on coaches covered by this supplement.

All information pertaining to this relay on pages 213 and 214 in Maintenance Manual X-6215 will apply. However, the specifications listed on page 221 for this relay should be revised as follows:

Small Unit (Starter Relay)

Air Gap (points closed)	0.011" Min.
Point Opening	0.025"
Closing Voltage Range	6.3 - 8.2
Opening Voltage	2.0 Min.
Sealing Voltage	8.7 Max.

NOTE: If closing voltage is set as high as 10.2 starting motor engagement may not occur, particularly after periods of high current draw.

LIGHT BULB REPLACEMENT

The following procedures describe method of replacing the bulbs in the marker lights, taillights, and stop and directional lights. Procedures for replacing bulbs in all other lights on these coaches, which remain the same as used formerly, are explained in Maintenance Manual X-6215.

MARKER LIGHT BULB REPLACEMENT

To replace the bulb in marker lights used on these coaches it is necessary to separate the light housing from the coach roof. Housing is attached with two screws. Unhook the back retaining clip from small stud on the light housing partition, then separate the socket plate from light housing which will expose the bulb.

NOTE: If lens gasket is in poor condition, install new gasket; this also applies to gasket between light housing and coach roof.

TAILLIGHT BULB REPLACEMENT

Using a small bladed instrument, carefully pry the loop of lens retaining ring from groove in light body. Remove the retaining ring completely then remove the lens. Examine lens gasket and replace if necessary. Replace the bulb, then install lens and lens retaining ring. NOTE: Make sure ring is fully seated in body groove after installing.

STOP AND DIRECTIONAL LIGHT BULB REPLACEMENT

Remove slotted nuts from four studs which attach the lens to light body. Remove lens, then replace bulb. Before installing lens, examine lens gasket for collapsed or deteriorated condition and replace if necessary. Tighten lens retaining nuts evenly and firmly.

FLUORESCENT LIGHTING SYSTEM

All fluorescent lighting system information described in Maintenance Manual X-6215 will apply to coaches covered by this supplement, with the exception of the following:

GENERAL INFORMATION

The power supply unit on standard coaches is mounted on partition above and to the rear of driver's seat (fig. 6) and is enclosed by a cover having screened opening at both top and bottom.

On some coaches, as special equipment, the power supply unit may be mounted behind the closure panel at right side of dash as located on coaches in the past.

The components of power supply unit on these coaches differ slightly from those used on former units in that the four diodes and transistors are of new construction (fig. 7). The body of each diode is pressed into a hole in the printed circuit board and is then soldered to the center printed circuit foil section. Formerly, each diode was bracket-mounted and retained with a nut and washer.

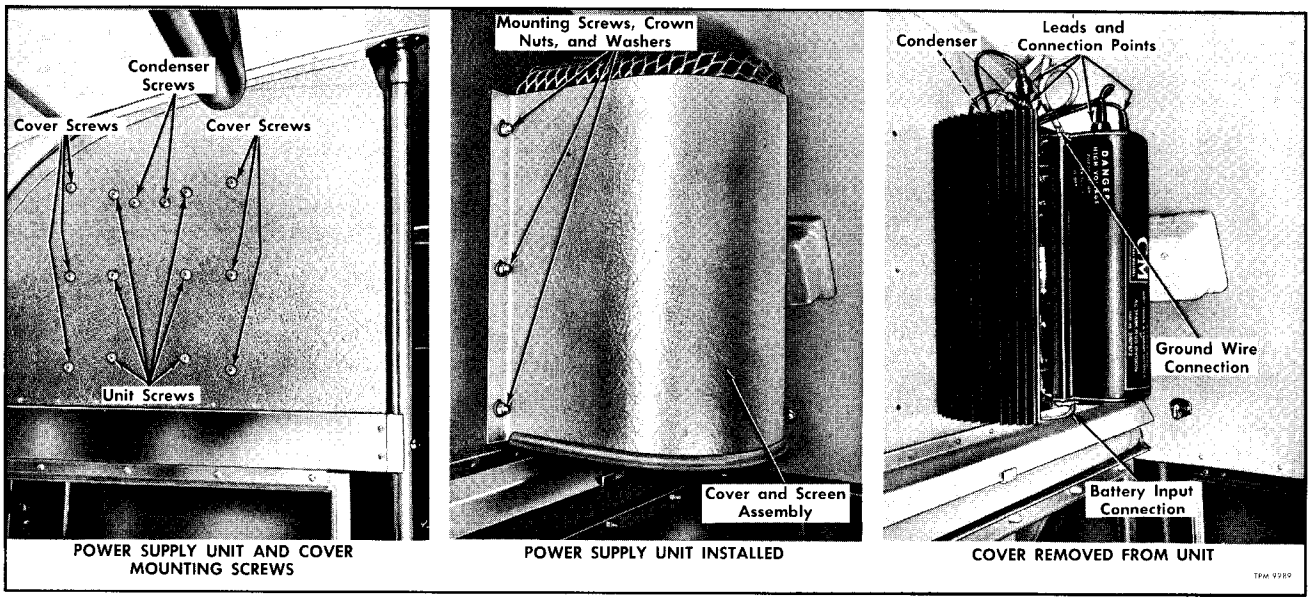


Figure 6—Fluorescent Lighting Supply Unit Installation Views

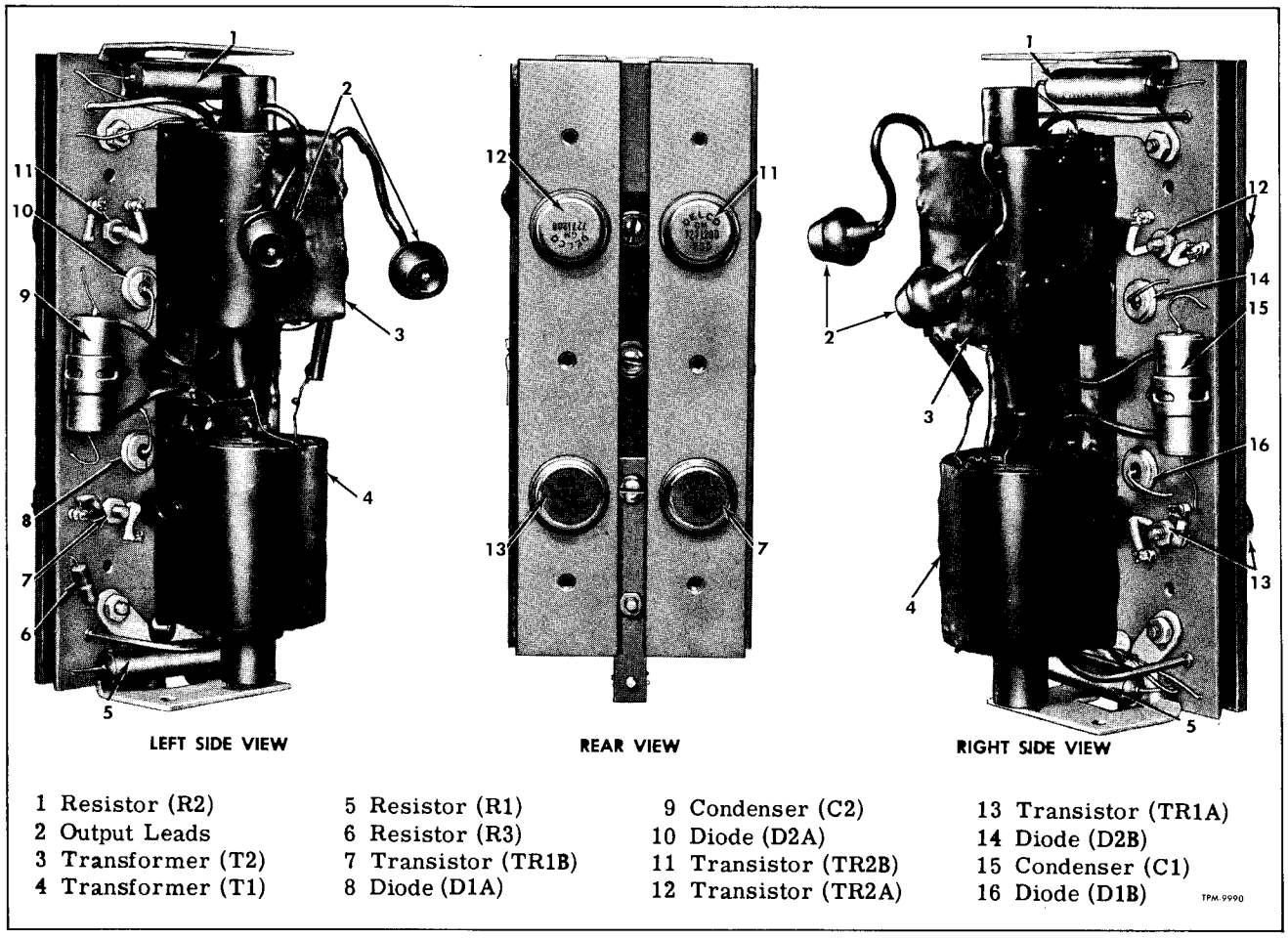


Figure 7—Power Supply Unit Components

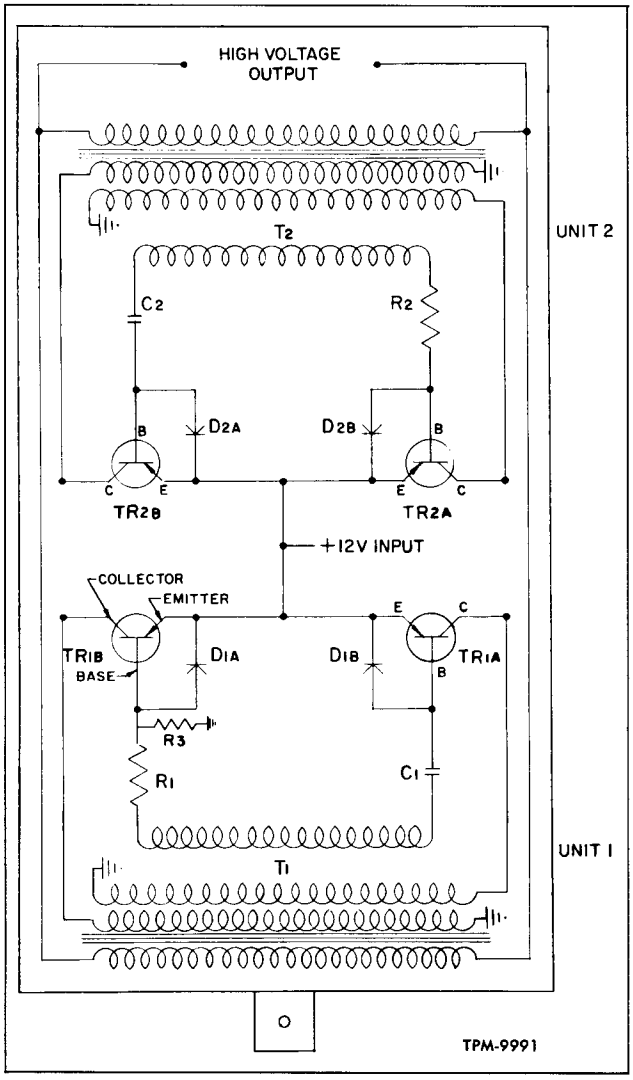


Figure 8—Power Supply Unit Circuitry Diagram

The four transistors in the unit on these coaches, having flexible insulated leads instead of former straight (solid metal) leads, are mounted in same relative position as in the past. The flexible leads are solder-connected to lugs at top side of printed circuit board making it more convenient for replacing if necessary.

Because of the above mentioned revisions, the power supply unit circuitry diagram (fig. 8), the unit ohmmeter checks diagram (fig. 9), and the transistor installation view (fig. 11) have been revised accordingly.

Seven capacitors (sometimes referred to as condensers) are used in this lighting system outside of the power supply unit. One capacitor is installed at each of the six lamps. The seventh capacitor, on these coaches, is located behind the power supply unit as shown in right view of figure 6.

On coaches having power supply unit located behind dash panel, this same capacitor is located in the small compartment directly above the front entrance door. The primary purpose of this seventh capacitor is to assure a more positive starting of lighting system when switch is turned on. Access to this capacitor which is actually contained in a two section plastic cylinder, is gained by pulling cylinder apart at the center.

NOTE: When reading service information in Maintenance Manual X-6215, instead of referring to specified illustrations therein, refer to comparable illustrations in this publication.

PRECAUTIONS

On pages 257 and 258 in Maintenance Manual X-6215 is listed six precautions which must be abided by whenever the fluorescent lighting system is being checked or serviced.

Failure to comply with these safety precautions could result in personal injury or damage to lighting system components.

TROUBLESHOOTING SYSTEM

In addition to information explained under "Troubleshooting" on page 258, in Maintenance Manual X-6215, the following solution to malfunction should be added under step 2 "Lamps Flash But Do Not Stay Lit" and step 3 "Lamps Fail to Light."

Turn light switch off, then remove the capacitor located behind the power supply unit on coaches having supply unit mounted behind driver's seat. On coaches having supply unit mounted in dash compartment, this capacitor is located in compartment above front entrance door. Turn light switch on. If lights operate, this is an indication that capacitor is shorted and must be replaced.

POWER SUPPLY UNIT REPLACEMENT

The following procedure applies to the replacement of power supply unit mounted on partition at rear of driver's seat. If supply unit is mounted behind closure panel at right of dash, replacement procedure explained on page 259, in Maintenance Manual X-6215 will apply.

CAUTION

Before attempting to remove or install power supply unit, observe "Precautions" listed on pages 257 and 258 in Maintenance Manual X-6215.

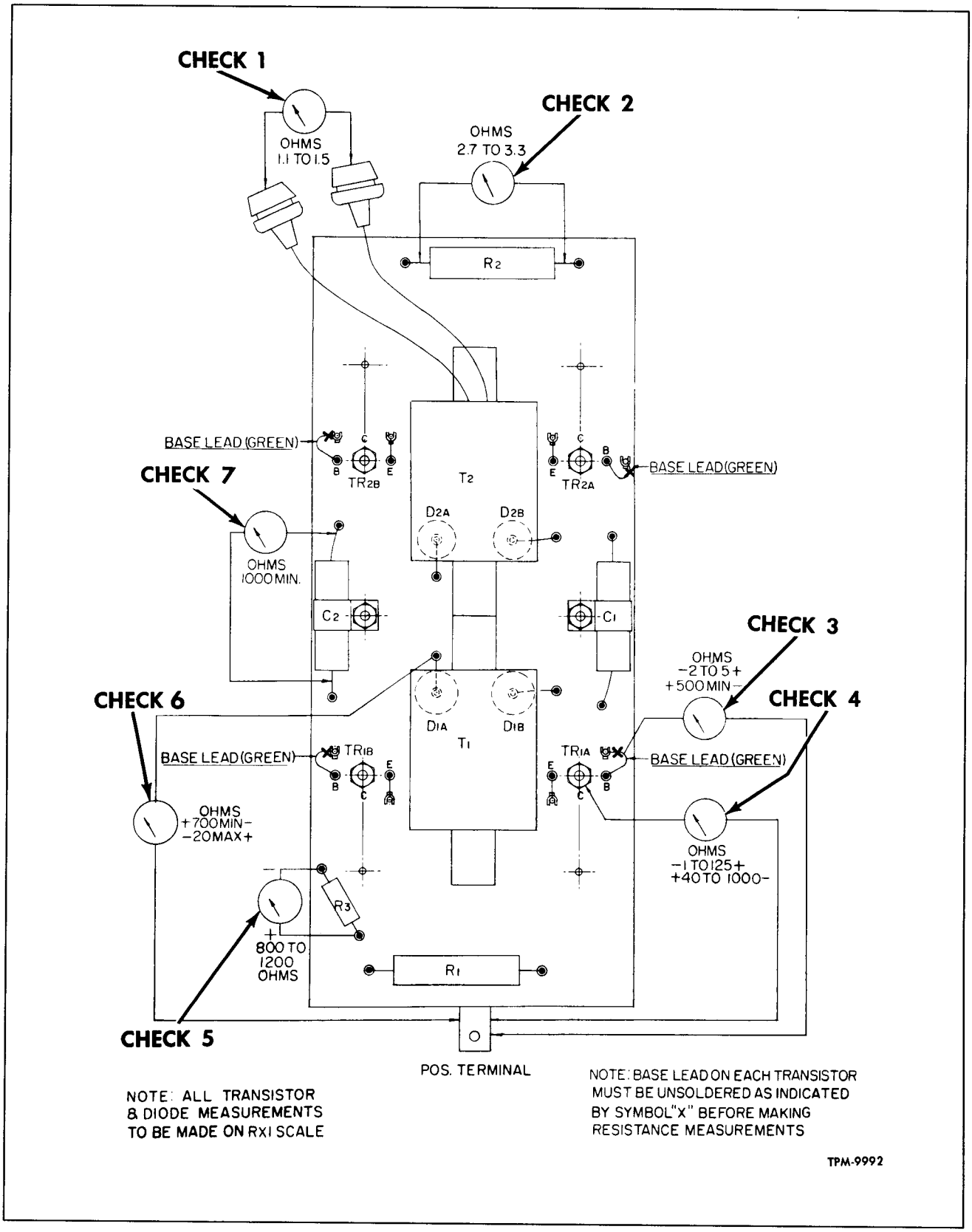


Figure 9—Power Supply Unit Ohmmeter Checks

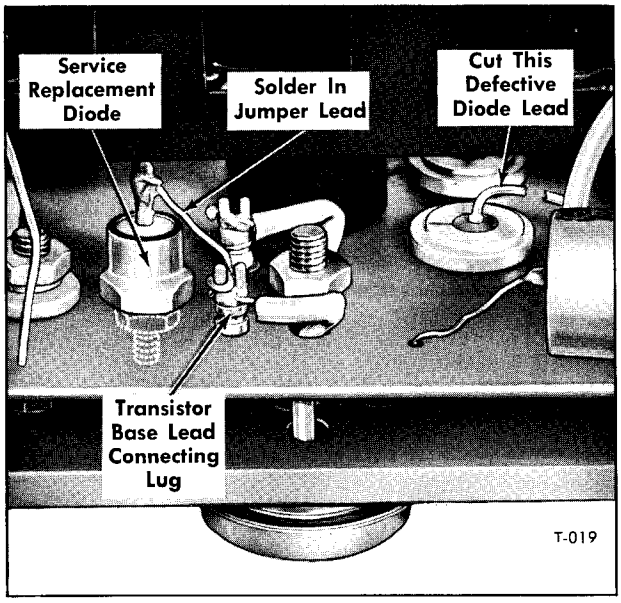


Figure 10—Service Replacement Diode Installed

REMOVAL

NOTE: Refer to views in figure 6.

IMPORTANT: Make sure both the "MASTER" switch and the "DOME" switch are in "OFF" position.

1. Remove six crown nuts and screws which attach cover assembly over the power supply unit. Remove cover assembly.
2. Disconnect input lead at bottom of power supply unit. Right view of figure 6 identifies wiring connections at unit.
3. At top of supply unit, disconnect condenser leads from rubber-covered terminal sockets in unit cover.
4. Disconnect ground wire from supply unit.
5. While supporting weight of power supply unit, remove six screws which attach unit to partition. Screws are accessible at rear of partition. Remove unit.

INSTALLATION

NOTE: Refer to views in figure 6.

IMPORTANT: Make sure both the "MASTER" switch and the "DOME" switch are in "OFF" position.

1. Place supply unit with heat sink assembly to partition and attach with six screws. Tighten screws firmly.
2. Connect ground wire to unit.
3. At top of unit, connect condenser leads to rubber-covered terminal sockets in unit cover.
4. Connect input lead at bottom of power supply unit.

NOTE: Make sure all connections are secure.

5. Attach cover over the supply unit to partition with screws, washers, and nuts.

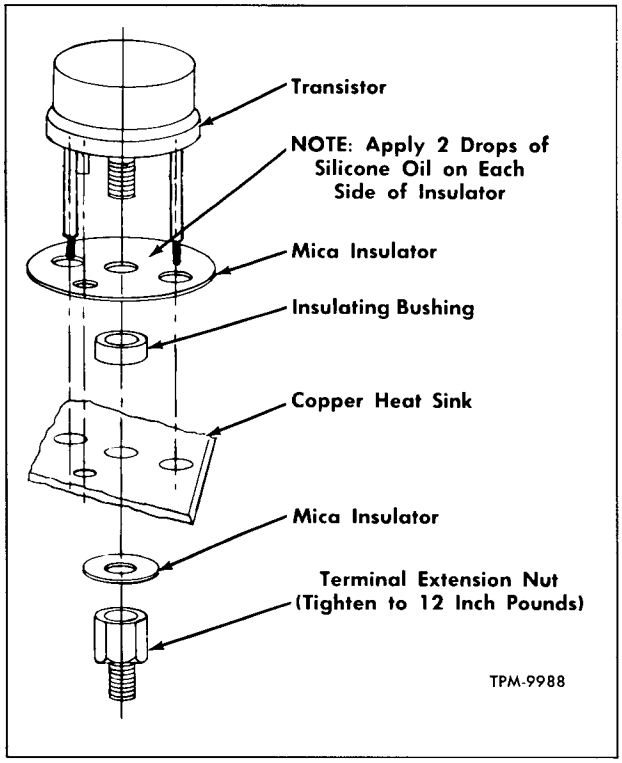


Figure 11—Installation View of Transistor

TROUBLESHOOTING UNIT

NOTE: Whenever the power supply unit components are being checked, and the Simpson Model 240 Multimeter is used, the "R x 1" scale must always be used.

TRANSISTORS TR1A, TR1B, TR2A, AND TR2B

IMPORTANT: Before checking these transistors (check 3, fig. 9), unsolder the base lead having the green insulating loom from terminal lug. Figure 10 shows the base lead connection.

Continue with check as directed on page 263 in Maintenance Manual X-6215.

RESISTOR R3 (Check 5, fig. 9)

When making Check 5, as directed on page 263 in Maintenance Manual X-6215, a varied reading of 800 to 1200 ohms should be obtained and not 850 to 1700 ohms as stated.

DIODES D1A, D1B, D2A, AND D2B

After having checked condition of diodes as directed on page 263 in Maintenance Manual X-6215 and a defective diode was found, install a service replacement diode as follows:

NOTE: Figure 10 shows a service replacement diode installed. A nut and lock washer secures this diode to printed circuit board and holes are provided in board for this purpose.

1. Insert threaded stud end of service replacement diode down through hole in printed circuit board. Secure diode firmly with nut and washer.

2. Cut a short piece of jumper wire and solder one end to diode lug and the opposite end to transistor base lead (green) connector lug as shown.

3. IMPORTANT: Cut or break the lead at top of defective diode at point shown in upper right portion of figure 10.

NOTE: It is not necessary to remove the defective diode from power supply unit.

REPAIR

All repair information on page 263 in Maintenance Manual X-6215 will apply with the exception of the following:

Disregard the "NOTE" stating in effect that it is necessary to disconnect certain leads between transistors whenever power supply unit is disassembled for testing or repair. This procedure is no longer required. Figure 11 shows transistor installation view. Make sure the mica insulator is positioned as shown when installing transistor.

WIRING DIAGRAMS

All wiring diagrams in Maintenance Manual X-6215 will apply to like coaches covered by this supplement with the exception of the following:

Engine Control and Generator Wiring Diagram (Standard TDH and SDH Models) MD-92662

Engine Control and Generator Wiring Diagram - With Automatic Engine Shut-off System (TDH and SDH Models) - MD-92663

The above wiring diagrams are included in back of this manual.

ENGINE

EXHAUST MUFFLER REPLACEMENT

The exhaust muffler on these coaches is strap-mounted longitudinally between the engine bulkhead and the bulkhead at rear of axle.

Instructions for removing and installing muffler are as follows:

REMOVAL (Refer to Figure 12)

1. Remove nut at all three clamps securing exhaust and tail pipes to muffler. Position clamps rearward on pipes.

2. While supporting weight of muffler, remove nuts from hanger strap eye bolts, then lower muffler from overhead hanger brackets and straps.

INSTALLATION (Refer to Figure 12)

1. Locate muffler assembly in position at hanger brackets and install two hanger straps around muffler and over hanger brackets. Make sure straps are properly engaged in hanger brackets. Install strap eye bolt nuts loosely.

2. Install clamps securing tail and exhaust pipes to the muffler. Tighten clamp nuts firmly.

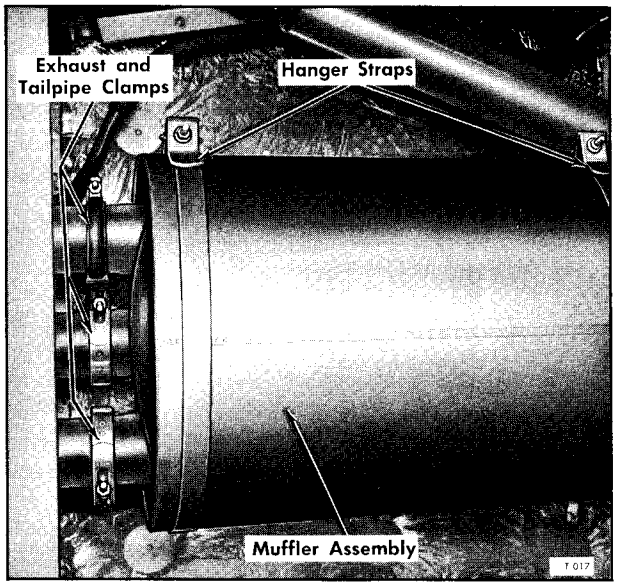


Figure 12—Engine Exhaust Muffler Installed

3. Final tighten muffler hanger strap eye bolt nuts firmly.

AIR SUSPENSION

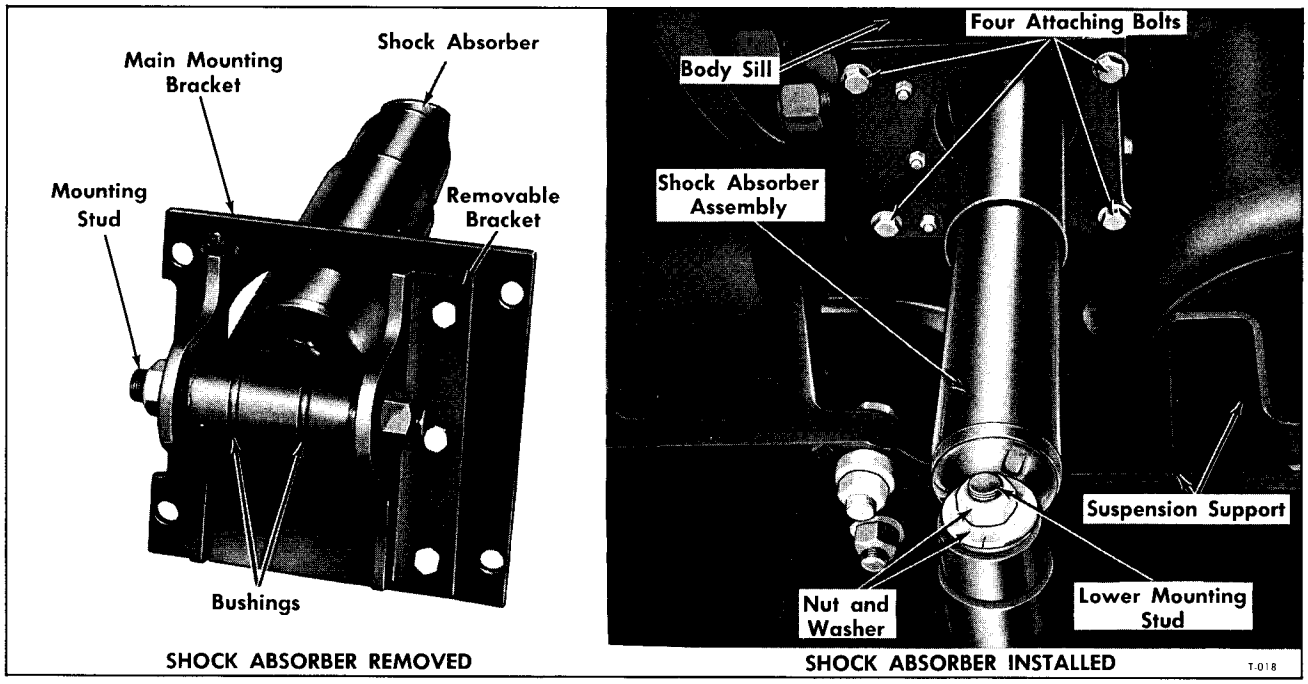


Figure 13—Rear Shock Absorber

REAR SHOCK ABSORBER REPLACEMENT

The following describes the procedure for replacing the rear shock absorber assembly.

REMOVAL (Refer to Figure 13)

1. Remove four bolts and washers which attach the shock absorber upper mounting bracket to body sill.
2. At lower mounting stud, remove nut and washer retaining shock absorber to stud. Remove shock absorber with attached upper bracket. Left view in figure 13 shows assembly removed.
3. Remove nuts from each end of shock absorber eye stud, then remove three bolts and nuts which attach the removable side bracket to the main mounting bracket assembly. Remove bracket, then separate bushing components.

INSTALLATION (Refer to Figure 13)

1. Assemble rubber bushings to the shock absorber upper eye, mounting stud, and main mounting bracket as shown in left view of figure 13.
2. Install removable side bracket to mounting stud, then attach bracket to the main mounting bracket with three bolts and nuts. Install nut at each end of mounting stud. Tighten all nuts firmly.
3. Locate shock absorber with assembled upper bracket into position, then install lower end of shock absorber with assembled bushings over mounting stud at suspension support. Install stud nut and washer. Tighten nut firmly.
4. Attach shock absorber upper mounting bracket to body sill with four bolts and washers.

NOTE: Make sure upper mounting bracket is located to sill in manner shown in right view of figure 13. Tighten mounting bolts firmly.

HYDRAULIC DRIVE TRANSMISSION (MODEL VH)

The information contained in this supplement covers the Model VH transmission as used in TDH 4518, 4519, 5303, and 5304; also SDH 4502 and 5302 coaches. This information supplements and supersedes instructions in Form X-5817, as indicated in text following.

GENERAL

In brief, internally the major change in the transmission is a new direct drive clutch unit. Externally the controls have been simplified (refer to Wiring Diagram), the heat exchanger is new and has been relocated, the oil filter is also relocated as shown in figure 1.

DRIVING INSTRUCTIONS

Refer to current "Operating Manual" for transit and suburban models. Driver's control lever is now located on the floor, instead of on instrument board as indicated on page 3 of X-5817.

GENERAL DESCRIPTION AND OPERATION

Sectional View of GM Hydraulic Drive Transmission shown on page 5 of X-5817 should be disregarded, as the current transmission is illustrated in figure 2 on next page.

Fluid system in hydraulic drive, also in direct drive, and lubrication and converter supply system, shown in figures 6, 8, and 10 on pages 7, 9, and 11 of X-5817, should be disregarded. Refer to comparable drawings in this supplement which illustrate relocated fluid filter, new heat exchanger and fluid lines. See figures 3, 4, and 5.

CLUTCH

Direct and hydraulic clutches with associated parts are illustrated in this supplement. Except for minor improvements and dimensional changes the hydraulic clutch remains unchanged. The direct clutch has been redesigned to include new drive, driven, and wear plates, also a separator plate (fig. 6). The new direct drive clutch permits the transmission to shift while the engine is at full power, therefore shifting time is reduced.

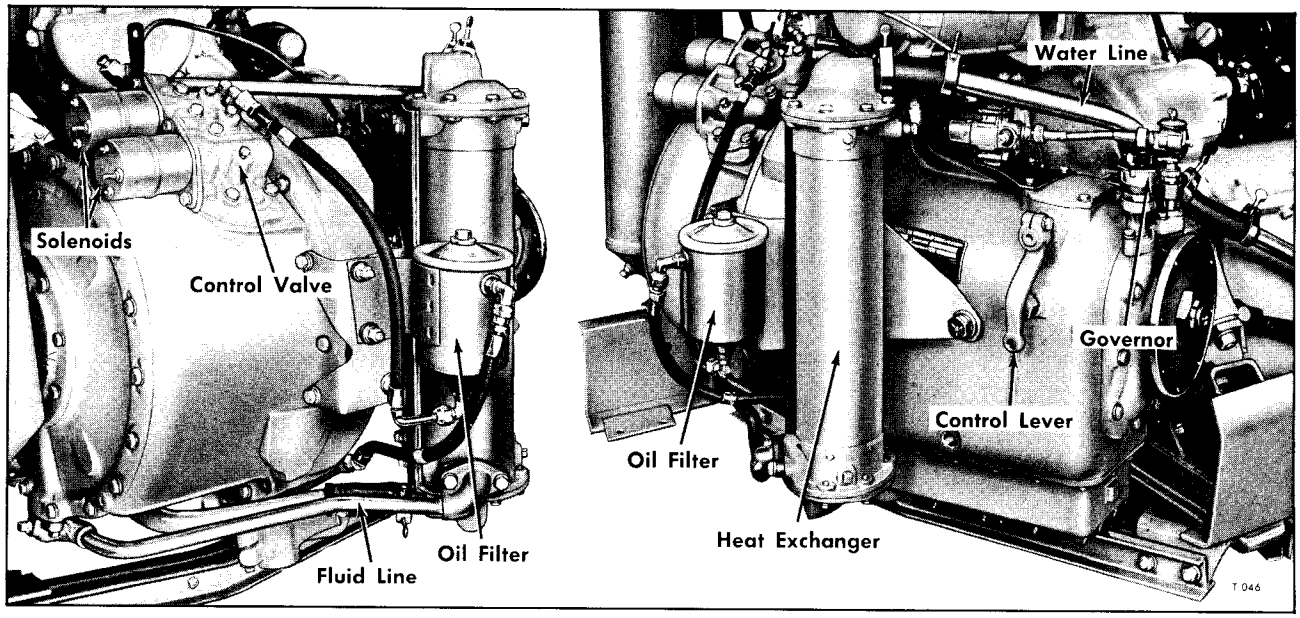


Figure 1—Transmission Mounted on Engine Cradle

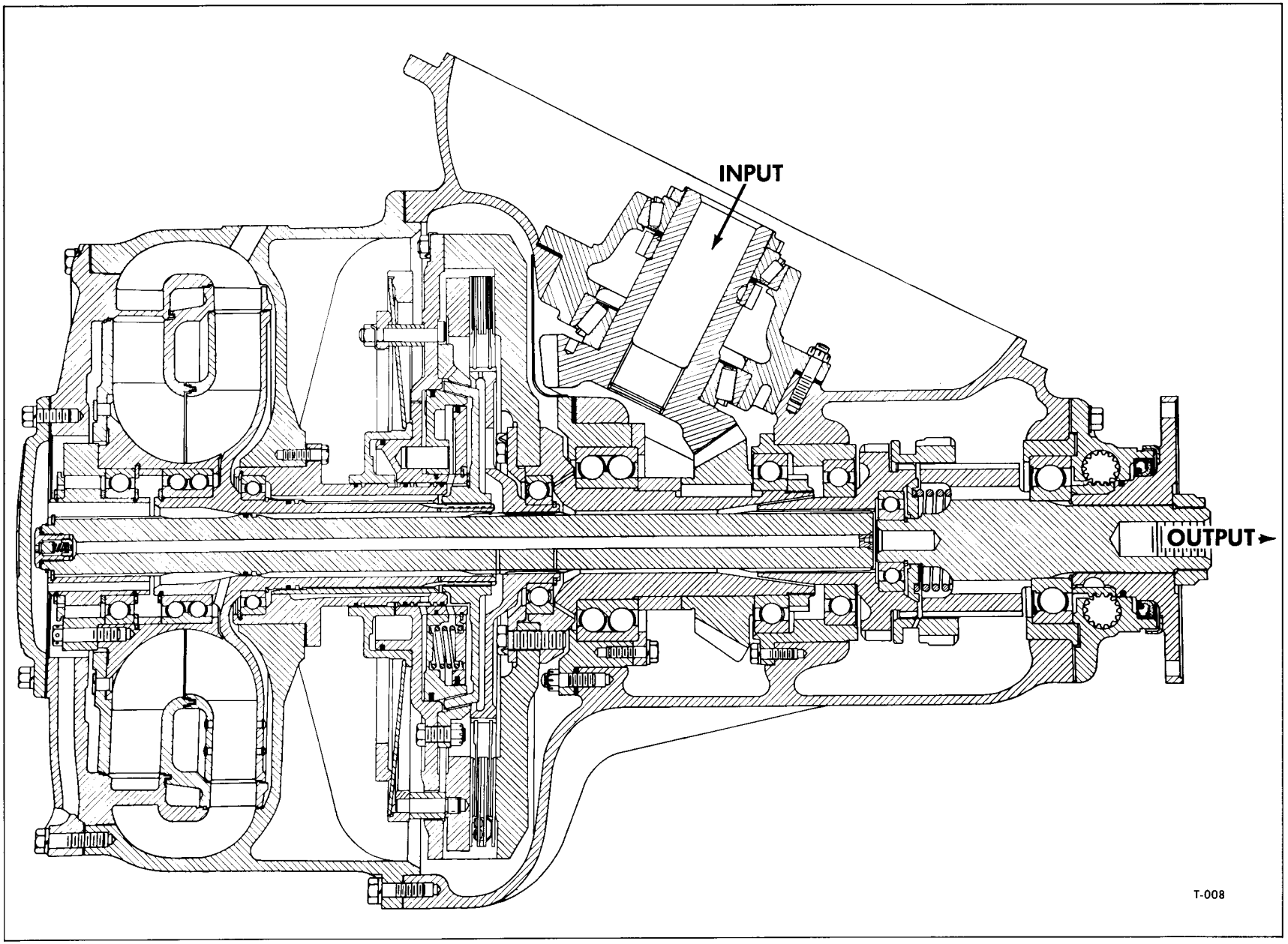
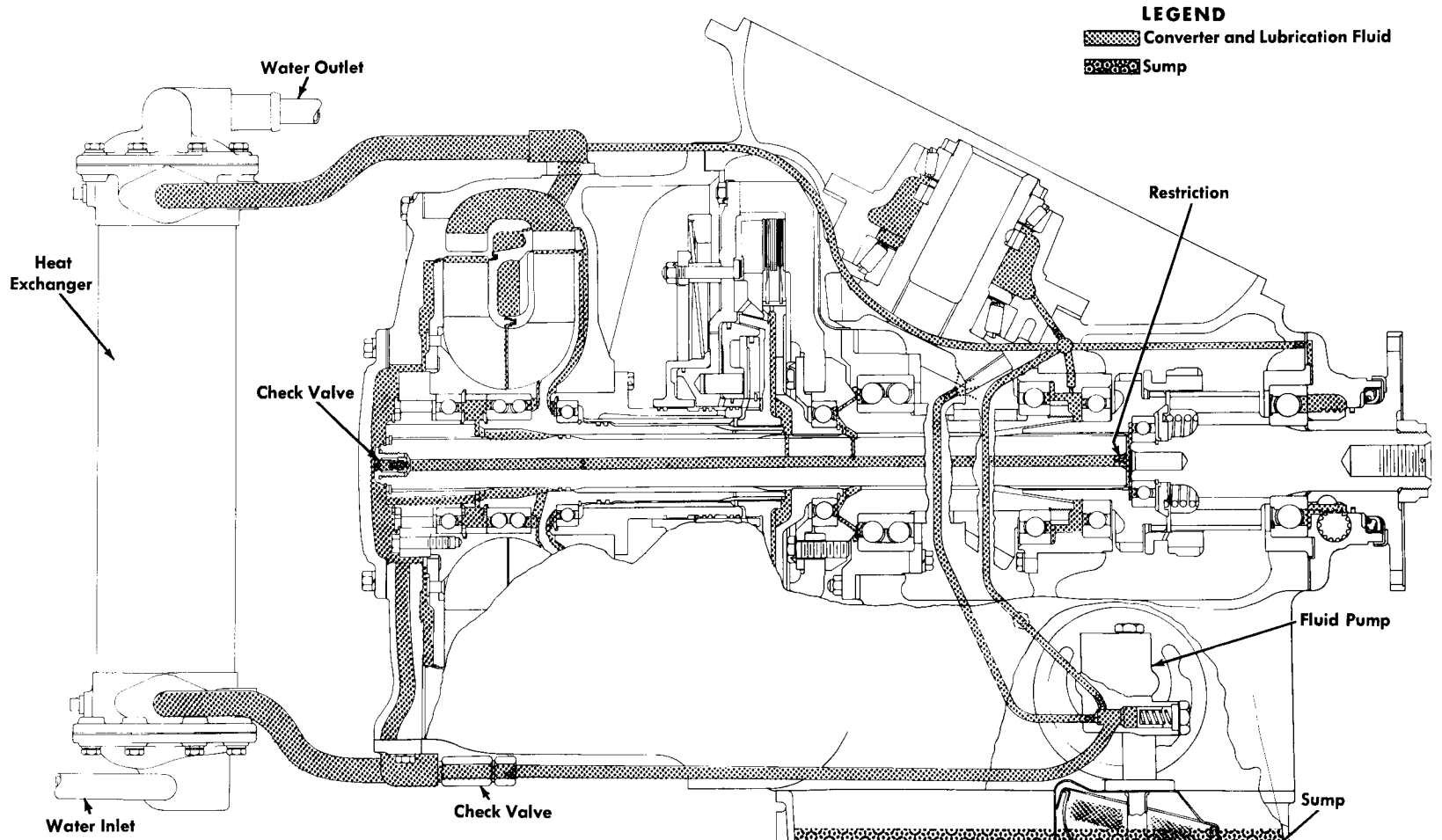


Figure 2—Sectional View of GM Hydraulic Drive—Model VH



Lubrication pump picks up oil from the sump and feeds it to the bevel gears and to a gallery in the case, also to the converter.

A jet of oil under pressure is directed directly onto tooth contact area of pinion and bevel gears.

Oil in the gallery is directed to three pockets which provide a bath of oil for bearings.

Oil, under pressure, is delivered to converter, some of which enters passage in drive shaft. Oil from drive shaft is sprayed onto clutch assembly, also onto center bearings from drilled holes in drive shaft. Oil from drilled passage in drive shaft is sprayed over reverse mechanism.

All rotating parts are above the oil level eliminating churning. Oil returns by gravity to the sump.

Figure 3—Lubrication and Converter Fluid Supply System

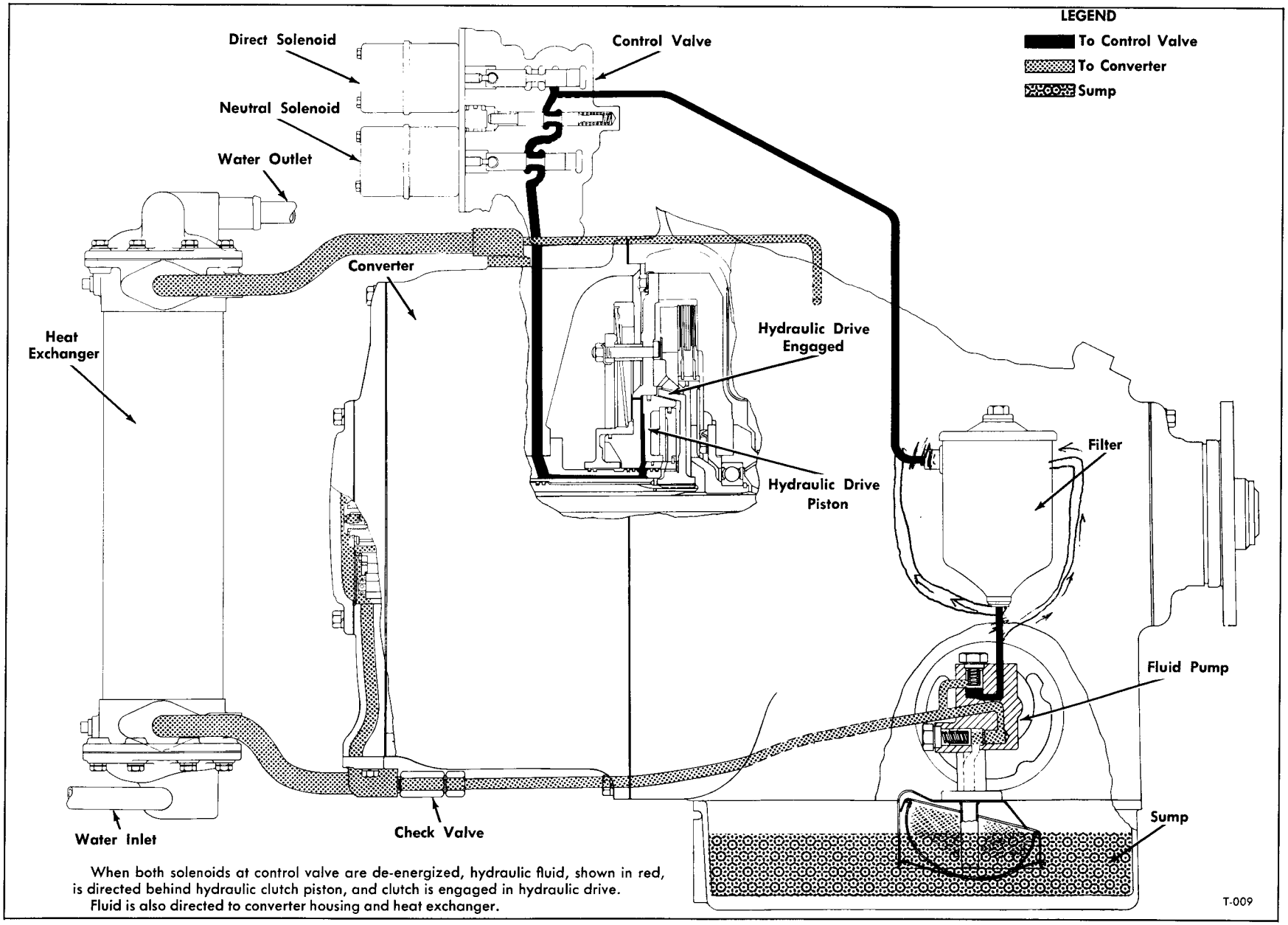


Figure 4—Fluid System in Hydraulic Drive

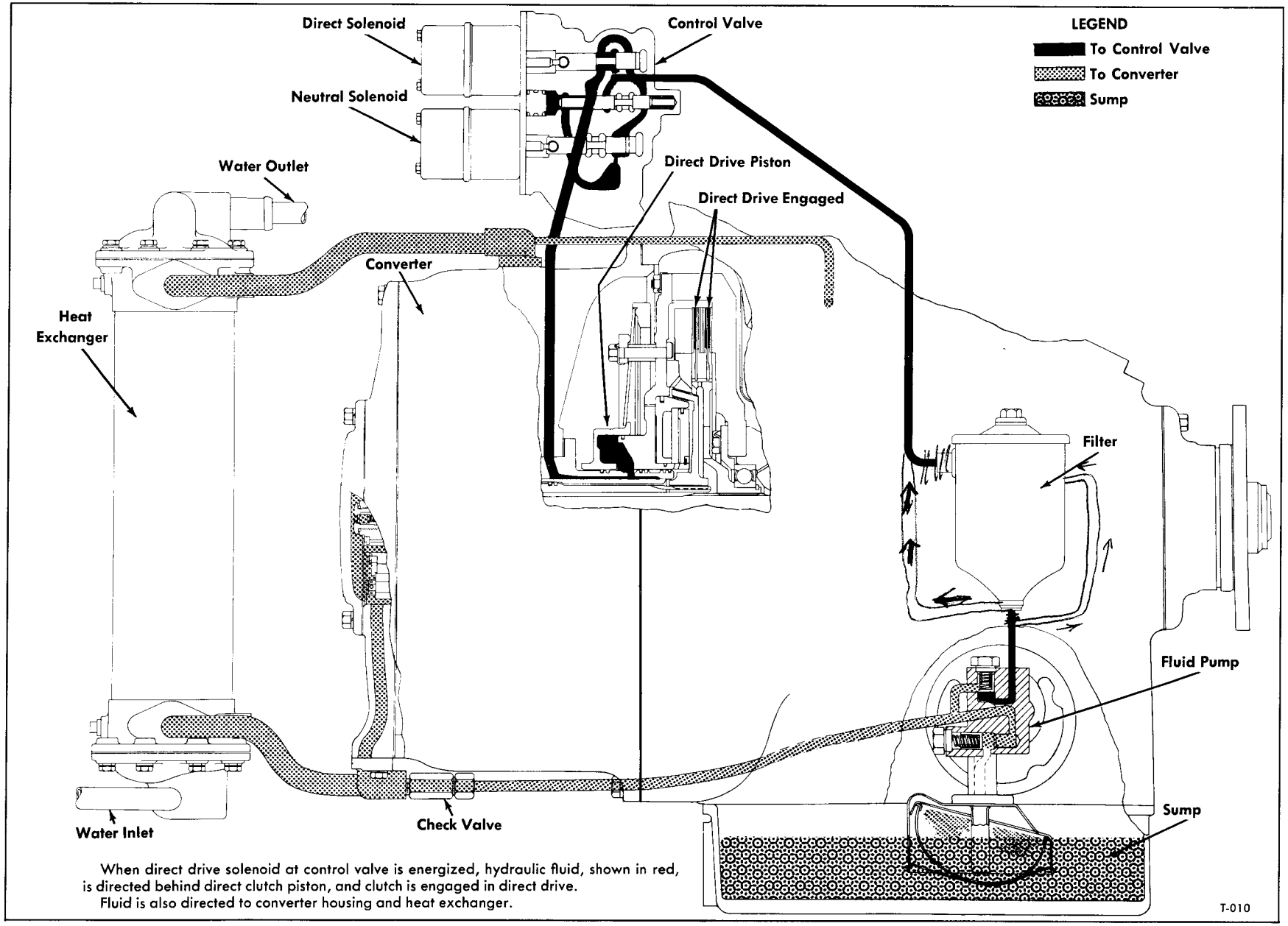
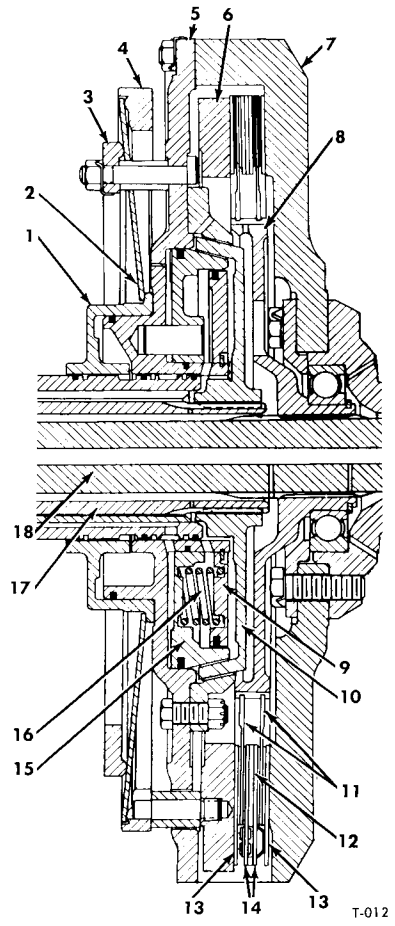


Figure 5—Fluid System in Direct Drive



PERIODIC MAINTENANCE

Information on pages 14 and 15 of X-5817 is applicable, except as indicated following:

Transmission Oil Filter. The oil filter has been relocated as illustrated in figure 1 of this supplement, however, it is the same type filter as used in the past and is therefore serviced in the same manner.

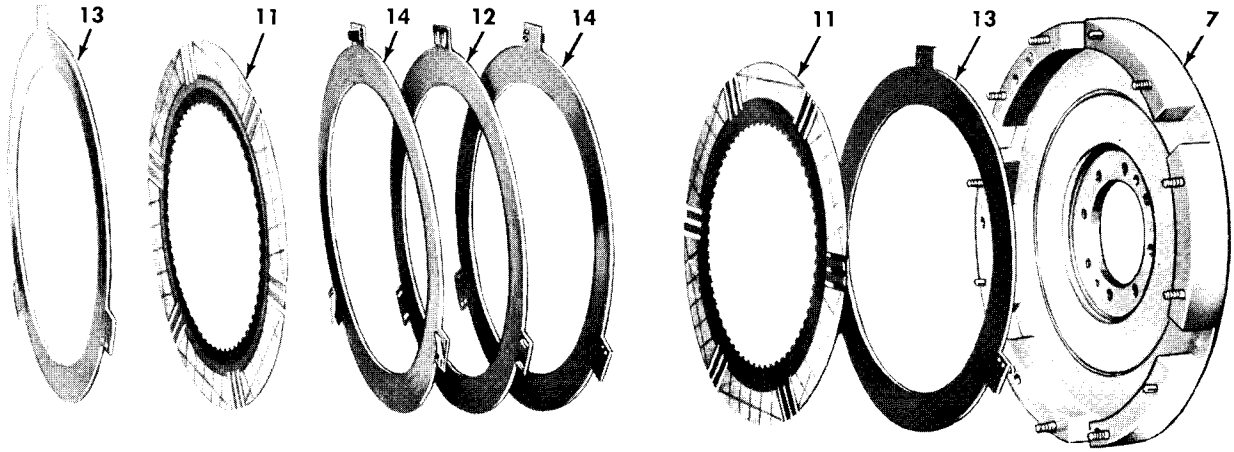
Heat Exchanger. The heat exchanger is new and is relocated as illustrated in figure 1. With the new exchanger the water enters and leaves the end plates instead of at sides; whereas the oil enters and leaves at the sides instead of at ends. With this new cooler the water is inside the tubes and the oil is outside the tubes.

CONTROL MAINTENANCE

Information on pages 16 through 22, X-5817 is applicable, except as indicated following:

Forward and Reverse Shift Adjustments

Refer to X-5817, page 18, paragraph 4 under subject heading. Information given indicates that clevis pin hole should be 5/32" rearward when shift lever is in "F" forward speed position. It is now recommended that the clevis pin should be free in neutral.



1 Direct Clutch Piston
2 Direct Diaphragm
3 Direct Ring - Rear
4 Direct Ring - Front
5 Clutch Cover
6 Pressure Plate
7 Drive Plate
8 Direct Hub
9 Spring Retainer
10 Hydraulic Clutch Cone
11 Direct Driven Plate
12 Separator Plate
13 Wear Plate
14 Wear Plate Assembly
15 Hydraulic Clutch Piston
16 Return Spring
17 Impeller Hub
18 Drive Shaft

Figure 6—Hydraulic and Direct Clutches

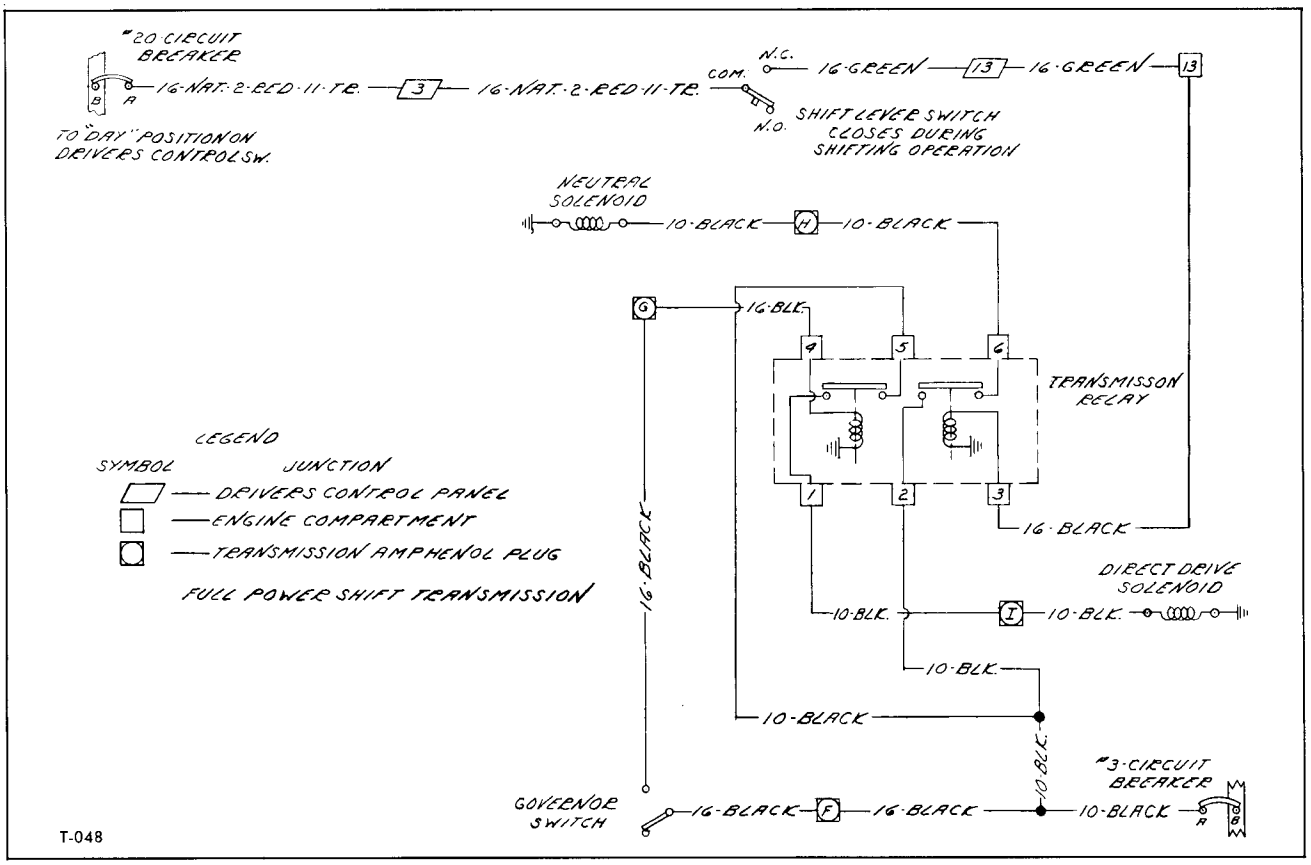


Figure 7—Transmission Control Circuit Diagram

Wiring Diagram. Wiring diagram shown in figure 18, X-5817 is now obsolete. Refer to circuit diagram (fig. 7) in this supplement.

Governor RPM Chart. In addition to information given in chart on page 21, X-5817 the following should also be added.

Ratio 5-3/6, Tire 10.00/20, Upshift (3) 940 RPM = 20.1 MPH, Downshift (4) 660 RPM = 14.2 MPH, Factor 46.56

Operators should note that two governor and switch assemblies are available and should be used only as indicated following: RPM range 940 up, 660 down #2361157 governor (switch kit #2286334); RPM range 830 up, 590 down #2383622 governor (switch kit #2420649).

OIL PRESSURE TEST

Test Procedure. Procedure and equipment for performing pressure tests to determine internal condition of transmission is as follows:

1. A tachometer and pressure gauges connected as illustrated in figure 8 should be used when testing transmission oil pressures.

2. With transmission forward and reverse shift lever in "Neutral," start engine and operate until fluid is at operating temperature or a minimum of 200°F.-220°F.

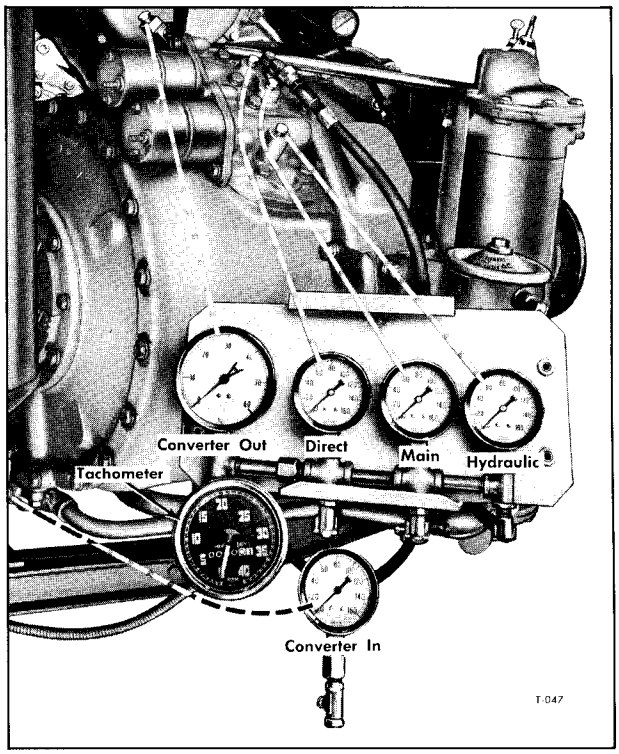


Figure 8—Testing Fluid System Pressures

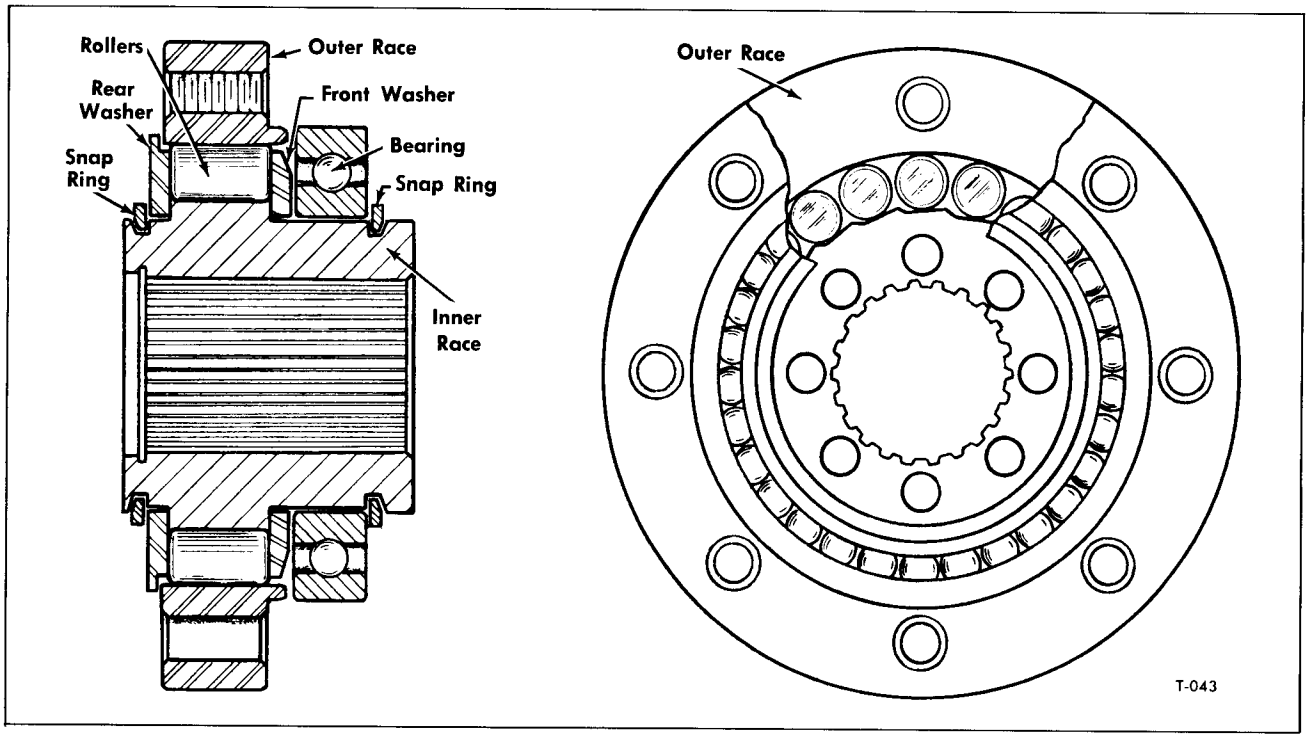


Figure 9—Overrunning Clutch Assembly

3. Observe main line pressure, which should have a minimum pressure of 40 P.S.I. at idle, 50 P.S.I. at 1500 RPM and 70 P.S.I. at 2000 RPM.

3. Observe hydraulic line pressure, which should have a minimum pressure of 40 P.S.I. at idle, 50 P.S.I. at 1500, and 35 P.S.I. when shifting from hydraulic to direct.

4. Observe converter out pressure which should be a minimum of 15 P.S.I. at idle and 55 P.S.I. at stall.

5. Connect a jumper line to direct solenoid terminal, then observe direct line pressure which should be the same as main line pressure indicated above. Remove jumper line.

6. Connect a jumper line to direct solenoid terminal, then observe pressure at converter in, which should be a minimum of 15 P.S.I. at idle and 35 P.S.I. at stall. Remove jumper line.

TRANSMISSION REPLACEMENT

Information on pages 23 through 25 is applicable to these vehicles. Figure 1, illustrated in this supplement, shows current transmission with relocated oil filter, heat exchanger, and connecting oil lines.

TRANSMISSION OVERHAUL

Information and illustrations on pages 25 through 60, X-5817 is applicable to these vehicles, except as indicated following.

OVERRUNNING CLUTCH

A roller type clutch, illustrated in figure 9, has superseded the types illustrated in figures 32 and 33, page 30 of X-5817.

Removal. Information given on page 29, X-5817 is applicable to the roller type clutch in current usage.

Disassembly. Remove front and rear snap rings, using snap ring pliers. Remove rear washer, rollers, and outer race. Press ball bearing from inner race by pressing on front washer and against bearing inner race.

CLUTCH

Hydraulic and direct clutch assemblies are sectionally illustrated (fig. 6) in this supplement. Components of direct clutch are illustrated (fig. 6) in this supplement. As previously explained the direct clutch has been redesigned, therefore removal and disassembly are covered in text following.

Removal

1. Straighten tangs on tab locks on each of the nine clutch drive plate stud nuts, then remove nuts and tab locks (fig. 41, X-5817).

2. Remove hydraulic clutch and direct pressure plate assembly (fig. 42, X-5817) from drive plate. In some instances it may be necessary to employ puller screws.

3. Refer to figure 6, and in the order listed, remove direct clutch plates from drive plate, (1) wear plate, (2) driven plate, (3) wear plate and

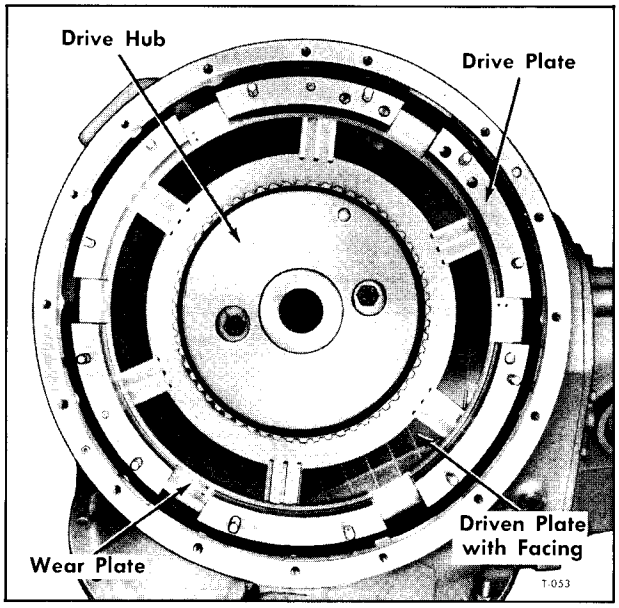


Figure 10—Drive Plate with Wear Plate and Driven Plate Assembly Installed

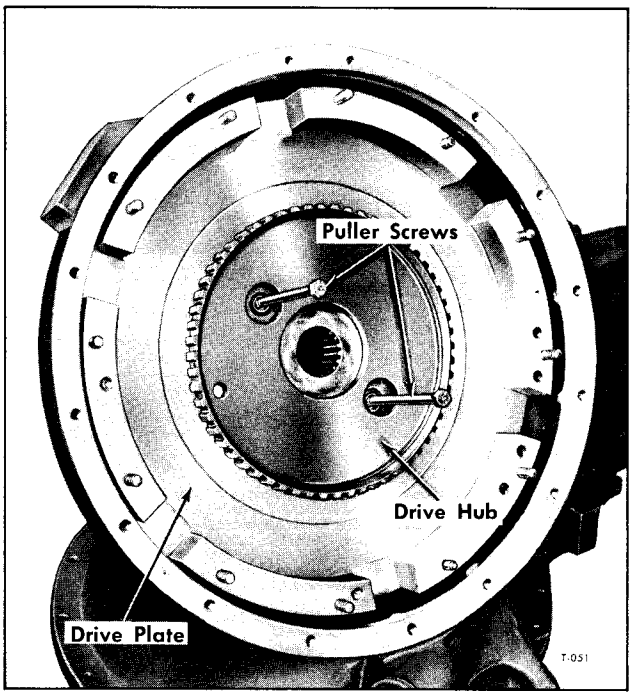


Figure 11—Removing Clutch Drive Plate and Hub

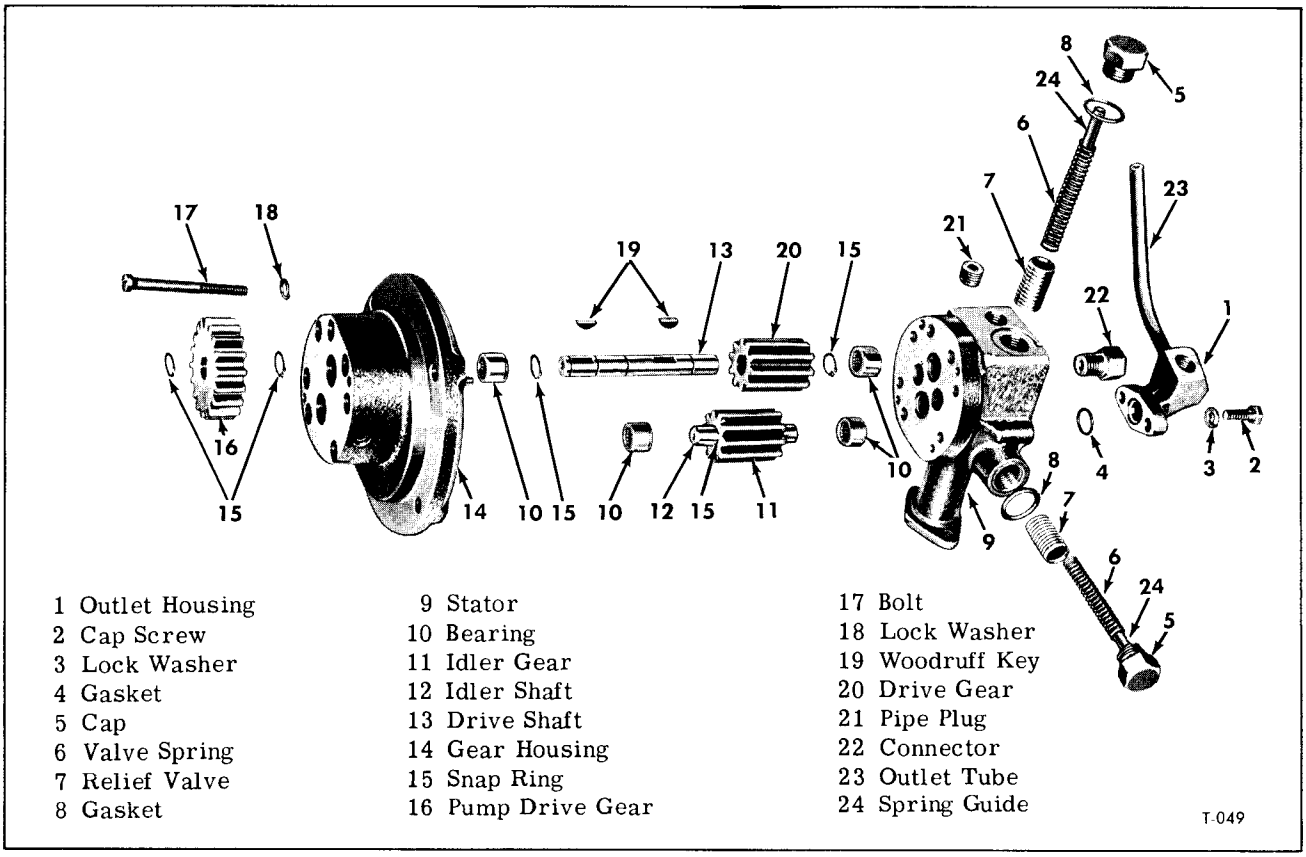


Figure 12—Fluid Pump Components

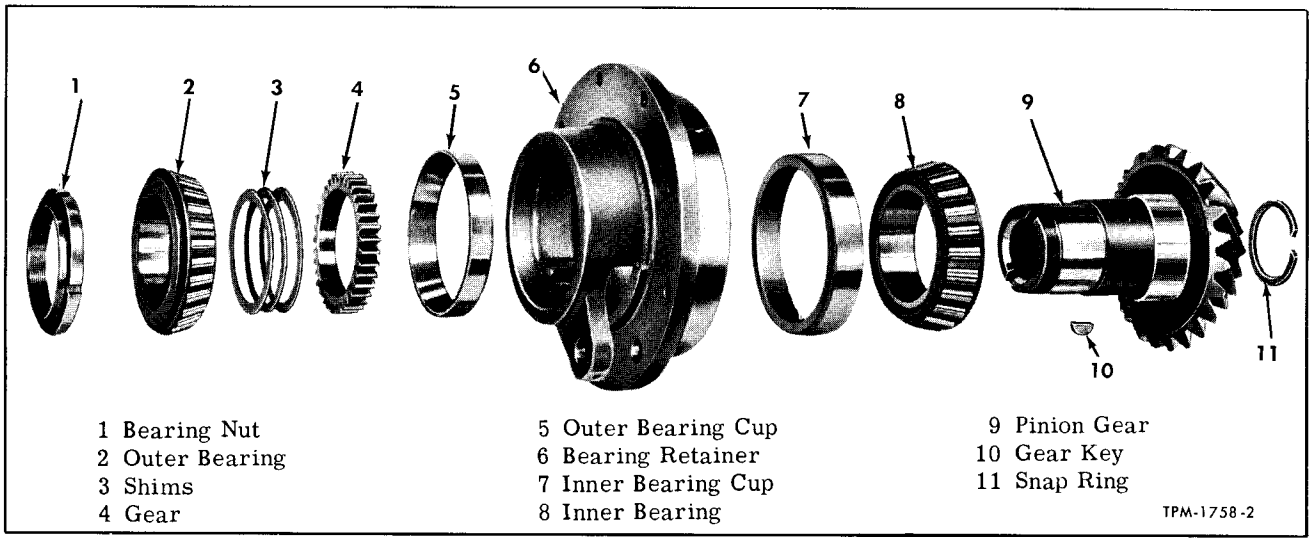


Figure 13—Bevel Pinion Gear and Bearing Components

spring, (4) separator plate, (5) wear plate and spring, (6) driven plate, (7) wear plate.

Disassembly. Information on pages 33 and 34 of X-5817 is applicable to hydraulic clutch. Figure 43 and 45 are obsolete and latest design is illustrated in figures 10 and 11.

FLUID PUMP

Fluid pump is installed as illustrated in figure 46, X-5817. Since there have been several changes the illustration showing the components is illustrated in this supplement. Pressure relief valve springs are now alike and spring guides have been added, also idler gear is now held to shaft with snap rings (fig. 12).

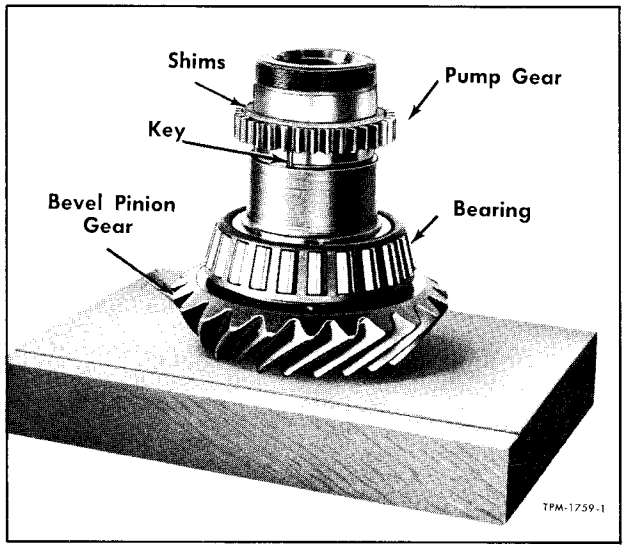


Figure 14—Installing Fluid Pump Drive Gear and Bearing Adjusting Shims

BEVEL PINION

A change in bevel pinion gear and bearing components has been made which eliminates the wave washer and substitutes a shim pack. Figures 13 and 14 shown on these pages supersede figures 68 and 70 shown in X-5817. A new procedure is required when adjusting preload. Paragraph 86, page 47 of X-5817 should be corrected as follows:

Use a spanner wrench to tighten bearing nut while rotating bearing retainer. Bearing preload will be correct when nut is tightened to 200-250 foot-pounds torque and 2-3/4 - 5-1/2 pounds pull on scale is required to rotate retainer as shown in figure 72, X-5817.

REVERSE GEAR INSTALLATION

Two bushings are used in reverse idler gear, the ends of which must be flush with end of gear. To secure bushing and prevent it moving in gear the end of bushings should be swaged at four places.

END COVER AND FLANGE

Refer to paragraph 3 under heading "End Cover and Companion Flange Installation" on page 55, X-5817. The companion flange nut should be tightened to a minimum of 300 foot-pounds torque.

CLUTCH

Assembly and Installation. Information given on pages 55 and 56 is applicable to clutch used on current transmission except paragraph 16. Refer to figure 6, and install direct clutch plate tabs in drive plate slots nearest to dowel pins. Plates are installed in the following order: wear plate, driven plate with facing, wear plate with spring tabs toward drive plate, separator plate, wear plate with spring tabs outward, driven plate with facing, and wear plate.

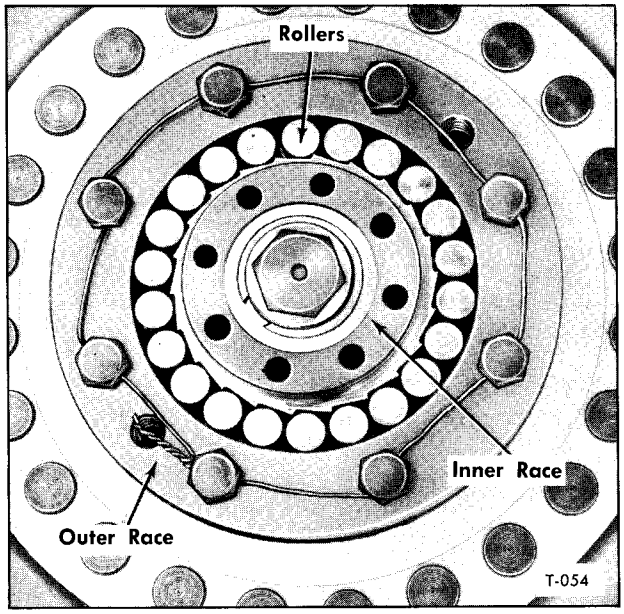


Figure 15—Overrunning Clutch Rollers and Races

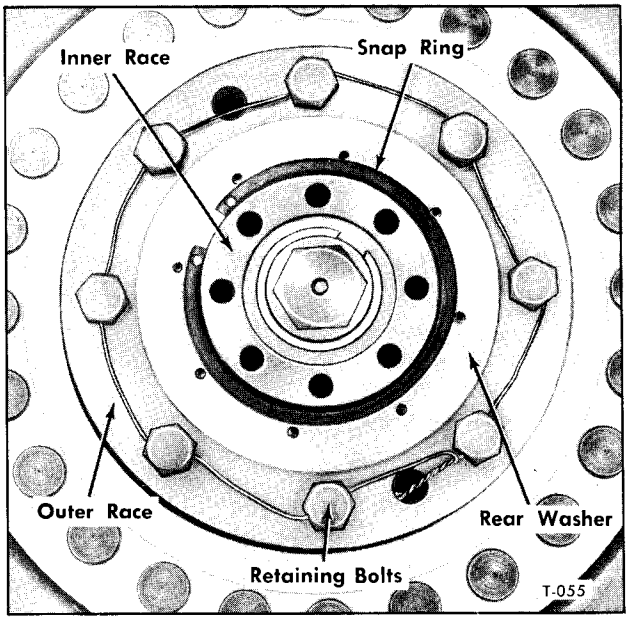


Figure 16—Overrunning Clutch Assembly Installed

OVERRUNNING CLUTCH

Overrunning clutch, illustrated in figures 94 and 95 have been superseded by a roller type illustrated in figure 9 in this supplement.

Assembly

1. Place front washer on clutch inner race with tapered side toward front or inner side.
2. Position inner race in arbor press, front end up, then press bearing onto inner race, being sure to press only on inner race of bearing. Secure bearing with snap ring.
3. Place assembly on bench, rear end up, then install outer race with projected side toward bearing.
4. Install 22 rollers between inner and outer races (fig. 15).
5. Install rear washer, then install rear snap ring. Flat side of snap ring must be toward washer.

Installation. Information given on page 59, X-5817 is also applicable to roller type overrunning clutch. Installation is illustrated in figure 16 of this supplement.

CONTROL VALVE

Accumulator valve, installed in converter housing under control valve, now uses two springs as shown in figure 17 of this supplement. Before installing control valve note that restriction plug is in place in housing at location indicated in figure 17.

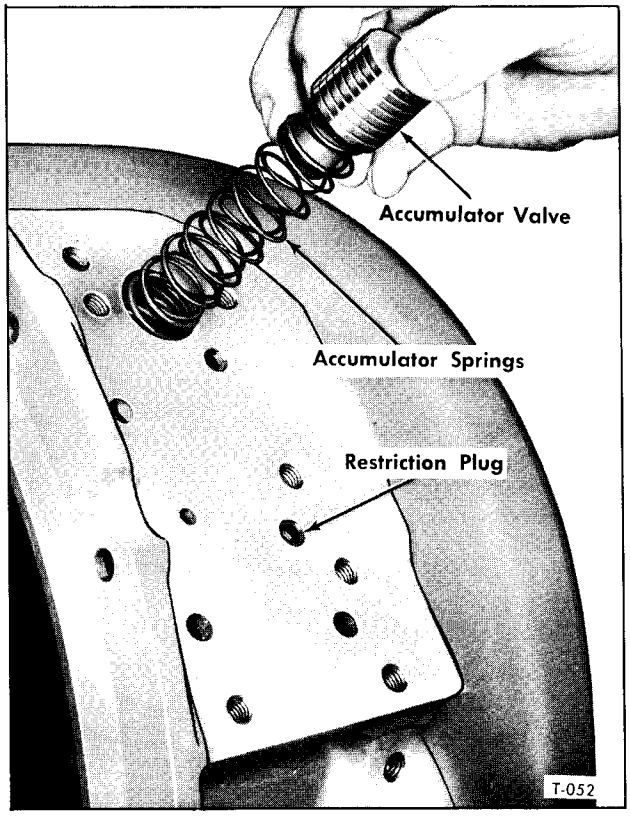


Figure 17—Installing Accumulator Valve and Springs

SPECIFICATIONS

The following specifications for parts are "New Limits," and should be used only to determine the amount of wear beyond the original dimensions, or when new parts are to be installed. These dimensions should not be interpreted as "Wear Tolerances."

PINION ADJUSTMENT
- Backlash . . . . . 0.006"-0.012"
- Backlash Adjustment Method . . . . . Shims
- Shim Thickness . . . . . 0.003"-0.010"
- Bearing Adjustment . . . . . Shims
- Shim Thickness . . . . . 0.010", 0.012", 0.016"
- Rotating Torque (In. Lbs.) 10-20
- Bearing Lock Nut Torque (Ft. Lbs.) . . 200-250

BEVEL GEAR ADJUSTMENT
- Backlash . . . . . 0.006"-0.012"
- Backlash Adjustment Method . . . . . Shims
- Shim Thickness . . . . . 0.003", 0.010"
- Bearing Lock Nut Torque (Ft. Lbs.) 500

DRIVE SHAFT
- Fluid Seal Groove Width
  - Standard . . . . . 0.125"-0.1265"
  - Oversize . . . . . 0.145"-0.1465"
- Fluid Seal Rings
  - Gap . . . . . 0.002"-0.007"
  - Standard Diameter . . . . . 1.781"
  - Standard Width . . . . . 0.1235"-0.1240"
  - Oversize Diameter Only . . . . . 0.015"
  - Oversize Width Only . . . . . 0.020"
  - Oversize Diameter and Width 0.015" & 0.020"

DRIVE SHAFT FLUID CHECK VALVE
- Opening Pressure (PSI) 10-15
- Closing Pressure (PSI) 5

DRIVE SHAFT BRAKE CONE
- Cone Thickness . . . . . 17/64"
- Cone Diameter . . . . . 3-1/2"
- Spring Pressure at 13/32" (Lbs.) 76-94

DRIVE SHAFT INTERMEDIATE GEAR
- Backlash . . . . . 0.012"-0.016"
- External Spline Backlash . . . . . 0.007"-0.011"

FORWARD AND REVERSE SHIFT GEAR
- Shift Groove Width . . . . . 0.443"-0.448"
- Backlash with Mating Gear . . . . 0.012"-0.016"

COMPANION FLANGE
- Seal Ring Groove Width . . . . . 0.127"-0.131"
- Seal Ring Width . . . . . 0.1225"-0.1240"

REVERSE SHIFT GEAR
- Flange Width . . . . . 0.430"-0.435"
- Bushing Diameter - Line Bore . . 1.501"-1.502"
- Backlash with Mating Gear . . . . 0.012"-0.016"

REVERSE IDLER GEAR
- Bushing Diameter - Line Bore . . 1.501"-1.502"
- Backlash with Mating Gear . . . . 0.012"-0.016"

REVERSE GEAR THRUST WASHERS
- Thickness . . . . . 0.061"-0.063"

REVERSE GEAR SHAFTS
- Diameter . . . . . 1.4985"-1.4990"

REVERSE SHIFT FORK SHOE
- Thickness . . . . . 0.430"-0.435"

REVERSE SHIFT PLUNGER SPRING
- Lbs. Pressure at 1-27/64" 11-13

REVERSE SHIFT SHAFT BUSHINGS - IN CASE
- Burnish . . . . . 0.875"-0.876"

SPEEDOMETER AND GOVERNOR GEAR SHAFT BUSHING
- Ream . . . . . 0.3740"-0.3755"

DIRECT CLUTCH PLATE AND FACINGS
- Thickness . . . . . 0.116"-0.122"
- Flat Within . . . . . 0.017"

DIRECT CLUTCH WEAR PLATE
- Thickness . . . . . 0.081"-0.085"
- Flat Within . . . . . 0.015"

DIRECT CLUTCH PRESSURE PLATE
- Thickness . . . . . 0.701"-0.699"

DIRECT CLUTCH PISTON
- Diameter at Cover Plate . . . . . 6.000"-6.002"
- Diameter at Housing Flange . . . 3.500"-3.502"

CLUTCH COVER PLATE
- Bushing Bore . . . . . 3.316"-3.318"
- Seal Ring Groove Width
  - Large Diameter . . . . . 0.127"-0.131"
  - Small Diameter . . . . . 0.965"-0.1005"
- Diameter at Direct Piston . . . . 5.994"-5.996"
- Diameter Seal Ring - Large Dia.
  - Diameter . . . . . 6.000"
  - Width . . . . . 0.1225"-0.124"
  - Gap . . . . . 0.002"-0.012"
- Fluid Seal Ring Small Dia.
  - Diameter . . . . . 4.032"
  - Width . . . . . 0.925"-0.935"
  - Gap . . . . . 0.005"-0.015"
  - Oversize Diameter Only . . . . . 0.020"

HYDRAULIC CLUTCH PISTON
- Inside Diameter . . . . . 4.032"-4.034"
- Outside Diameter . . . . . 8.847"-8.849"
- Fluid Seal Ring
  - Groove Width . . . . . 0.127"-0.131"
  - Ring Width . . . . . .123"-.124"
  - Ring Diameter (Std.) . . . . . 8.875"
  - Oversize Diameter . . . . . 0.020"
  - Ring Gap . . . . . 0.003"-0.013"

RETURN SPRING PLATE
- Seal Ring Groove Width . . . . . 0.127"-0.131"
- Fluid Seal Ring
  - Diameter . . . . . 8.000"
  - Width . . . . . 0.123"-0.124"
  - Gap . . . . . 0.003"-0.013"
  - Oversize Diameter Only . . . . . 0.020"

HYDRAULIC DRIVE CONE THRUST WASHER
- Thickness . . . . . 0.0615"-0.0635"

HYDRAULIC PISTON RETURN SPRINGS
- Lbs. Pressure at 1-7/64" 47.5-50.5

CONVERTER HOUSING FLANGE
- Diameter . . . . . 3.465"-3.470"
- Seal Ring Groove Width . . . . . 0.965"-0.1005"
- Fluid Seal Rings
  - Gap . . . . . 0.002"-0.007"
  - Standard Diameter . . . . . 3.500"
  - Oversize Diameter Only . . . . . 0.020"
  - Oversize Width Only . . . . . 0.020"
  - Oversize Diameter and Width 0.020" & 0.020"

CONVERTER IMPELLER
- Seal Ring Groove Width . . . . 0.1260"-0.1285"
- Fluid Seal Ring
  - Gap . . . . . 0.002"-0.007"
  - Standard Diameter . . . . . 2.562"
  - Standard Width . . . . . 0.124"
  - Oversize Diameter Only . . . . . 0.020"
  - Oversize Width Only . . . . . 0.020"
  - Oversize Diameter & Width . 0.020" & 0.020"

FLUID PUMP GEARS
- Width . . . . . 1.499"-1.501"
- Diameter . . . . . 1.1631"-1.1636"

GEAR SHAFTS
- Diameter . . . . . 0.4387"-0.4390"

PUMP DRIVE GEAR
- Backlash with Mating Gear . . . . 0.008"-0.012"

PUMP DRIVE IDLER GEAR
- Backlash with Mating Gear . . . . 0.008"-0.012"
- Bushing - Ream . . . . . 0.751"-0.752"

PUMP DRIVE IDLER GEAR SHAFT
- Diameter . . . . . 0.7495"-0.7500"

NEUTRAL AND DIRECT SOLENOIDS
- Make . . . . . Delco Remy
- Model 1114411
- Voltage 12

PUMP PRESSURE RELIEF VALVE SPRING
- Lbs. Pressure at 1.75" 17.3-21.3

TRANSMISSION CONTROL RELAY
- Make . . . . . Delco Remy
- Model 1116899
- Volts 12
- Air Gap (With Points Closed) . . . . . 0.014"
- Point Opening . . . . . 0.028"
- Closing Voltage Range 8.5-10.5
- Opening Voltage Range 4.3

TRANSMISSION OIL

Special Transmission Oil must be used in the transmission. This fluid must have anti-oxidation and anti-corrosion characteristics plus satisfactory lubrication qualities. Sources for oil will be supplied upon request.

AC-640 LUBRICANT

Also called "Type ST-640," this is packaged in metal tubes, available at United Motors Service stations and AC Spark Plug distributors.